Multidisciplinary Journal of Materials Science and Engineering
Volume 10 Issue 4, October-December 2022
ISSN: 2995-374X
Impact Factor: 6.65
http://kloverjournals.org/journals/index.php/mse

HEIGHTENED CONCERNS: EXPLORING SEISMIC RESPONSE IN BRIDGES WITH DIFFERENTIAL LONGITUDINAL PIER ELEVATIONS

Xu Chenglei
Zhongnan Design and Research Institute of China Municipal Engineering Co., LTD, Wuhan, 430014, China

Abstract
The rapid development and progress of urbanization has also driven the further development of transportation and construction industry on a certain level. If we really want to ensure the overall and effective improvement of the longitudinal pier height difference for the corresponding seismic performance of the bridge itself, we should also continuously strengthen the detailed grasp of the height difference in the construction process, so as to reduce the appearance of some obvious constraints. It is also under such basic conditions that this paper carries out a more in-depth study and discussion from three perspectives: a brief overview of height difference, precautions for bridge seismic response work, and research on the influence of longitudinal pier height difference on bridge seismic response, which also ensures the daily travel safety of the people to a great extent.

Keywords: longitudinal pier height difference; Bridges; Seismic response; influence

1. Introduction

With the continuous development and progress of the modern socialist market economy, the way of production and life have also undergone some obvious changes. In order to ensure the safety of the transportation industry at this stage from a deeper perspective, the upgrading and innovation of construction and construction methods should also be continuously strengthened, so as to provide good basic support for the improvement of seismic performance of the bridge itself to the maximum extent. Moreover, the longitudinal pier height difference has always had a very far-reaching impact on the and stability of the bridge. Only in the actual project construction process, further strengthening the reasonable control of the longitudinal pier height difference can improve its seismic performance and provide a more perfect foundation guarantee.

2. A brief overview of the height difference

The height difference mainly emphasizes that the elevation difference between two points is simply understood as the specific value obtained by reducing the end elevation from the starting elevation. the elevation measurement method in the actual bridge project construction management, we can grasp the unknown elevation points more accurately. If the unknown point is higher than the known point, the height difference between the two points is positive, and vice versa. Usually, the height difference is divided into several different types. Among them, the geometric leveling method is a more common of measuring height difference. It is mainly to ensure the isolation of the horizontal line of sight with help of the level, so that the stability of the height difference between the Bridges can be improved a deeper perspective. Related work technicians in the measurement process, should also pay more attention to the use of before and after the distance is equal, from the source to avoid some obvious in

the detection process. Then, we should also strengthen the reasonable grasp of the bubble centering accuracy of the coincidence level to ensure the accurate removal of parallax measurement. Finally, this calculation method of height difference is also easily affected by external factors, which requires strengthening the integration and management of relevant data information content under different external environments [1].

In addition, in the process of vertical management and analysis of bridge elevation difference, it can also be understood from a deeper perspective that the measurement methods of triangular elevation measurement, hydrostatic leveling, pneumatic elevation measurement and GPS elevation measurement can improve the load capacity and stability of the bridge itself. Provide relatively perfect basic

3. The attention of longitudinal pier height difference to bridge seismic response

3.1 Site selection

The construction of Bridges can ensure the safety and stability of People's Daily travel on a large level. In the specific design and management of bridge seismic effect, there are some obvious irrational seismic design phenomena, which will inevitably lead to the value and advantage of longitudinal pier height difference for bridge seismic response work is difficult to be more fully reflected. In view of the actual situation of the development of relevant industries in China at the present stage, continuously strengthening the investigation and detection of the geological conditions around the bridge can also improve the stability of hydrogeological investigation and provide more perfect basic support and guarantee. In particular, under the influence of various factors such as the activity of geological structure and the stability of geological conditions, it can also be understood that the accurate selection of the geographical location of the bridge can directly affect the actual situation of the final seismic work [2].

3.2 Model selection

In order to ensure from a deeper perspective that the seismic effect of bridge projects at this stage is fully reflected in the efficiency and advantages, constantly strengthening the important analysis of bridge structure selection has always been one of the most basic work steps. In view of the geological conditions of bridge engineering and the actual situation of the construction management of previous projects, the selection and design of the internal structure of the bridge can be mastered from a deeper perspective, and the actual changes of the internal structure of the concrete can also be directly affected. According to the economic and technical factors of the project construction, the selection of the subsequent bridge structure can also avoid the possibility of some obvious restrictive factors in the construction management of bridge projects. The reasonable choice of bridge void location is also one of the main factors to ensure the effective control of the bridge's load bearing capacity.

3.3 Detailed design

According to the actual situation of earthquakes in our country in the past, it can also be well understood that the earthquake intensity of 7 and above will bring more serious threats and challenges to the surrounding buildings. Therefore, in the process of designing pier columns for bridge structures, follow-up work should also be carried out strictly in accordance with relevant standards. The distance between the internal encryption stirrup of the bridge should also be controlled within 10 cm as far as possible, the diameter of the stirrup also needs to be above 10 mm, and the joint of the spiral stirrup also needs to be connected by welding, so as to ensure the rationality of the size of the bend hook well, and also improve the seismic structural efficiency of the bridge itself in a real sense. It has brought unprecedented guiding and promoting effect.

Multidisciplinary Journal of Materials Science and Engineering
Volume 10 Issue 4, October-December 2022
ISSN: 2995-374X
Impact Factor: 6.65
http://kloverjournals.org/journals/index.php/mse

4. Study on the influence of longitudinal pier height difference on seismic response of bridge

4.1 Elevation transfer measurement of high piers

In the process of bridge seismic response and construction management, in order to ensure the safety and stability of its work, the detailed management of the work content of the elevation transfer vehicle should also be strengthened from a deeper perspective. The calculation and integration of the actual situation from a deeper perspective is also one of the most important factors to ensure the stability and safety of bridge project construction at this stage. When the height difference between the bridge and the ground is more than 5 meters, the elevation of the level base point position can also transmit more detailed data information content to the position of the pier in a short time, and with the use and help of more professional instruments and equipment, it lays a very perfect foundation and prerequisite for its own stability control when the earthquake problem occurs. In order to ensure the independence and authenticity of the triangulation elevation measurement of the total station to the maximum extent, it is also necessary to ensure that the upper and lower parts are within 2 mm in the design of the longitudinal height difference of the pier, which can provide a more perfect and effective basic guarantee for the authenticity and effectiveness of the final measurement work transmission.

At the same time, in order to ensure the important value and advantages of the longitudinal pier height difference for the corresponding seismic work of the bridge, it is also necessary to actively strengthen the calculation and integration of relevant formulas, so as to ensure the smooth and effective promotion of subsequent work under the guidance of more accurate and detailed formulas. Further strengthening the rational use of spherical prism can also provide more perfect data information content support and guidance for the accurate calculation of longitudinal pier height difference [3].

4.2 Elevation control network

In the management and control work of the seismic response of the longitudinal pier height difference to the bridge, the elevation control network can provide more basic data information content support for the stability of the bridge itself. From a more objective point of view, we can also understand that the design of the elevation control network mainly needs to carry out comprehensive management of the elevation network in the process of using the fourth class triangular elevation points. Through the application of modern Internet information technology means, it can also carry out targeted measurements on the topography, geology and other conditions of the bridge construction location, so as to ensure that the value of the final longitudinal pier height difference on the seismic response of the bridge can be more comprehensive and effective. At the same time, the encrypted elevation control point should also be buried in the bottom stable position with a good view, so as to maximize the seismic efficiency and advantages of the final bridge itself, and provide good data information guidance.

4.3 Seismic design of force

In the process of bridge construction and construction, concrete structure is a more common and important component. Therefore, in the actual work process, the rational use of shear strength and compressive strength is constantly strengthened, which can also greatly improve the unreasonable design of bridge pier height difference. First of all, strengthening the detailed calculation of the use of the maximum shear force between floors can be well helped by the mode decomposition method to take the beam bridge as a two-particle system, so that it can adjust its own design and use structure from different angles, so as to meet the ultimate needs of the final seismic work. In the process of the model construction of the bridge, it is also necessary to strengthen the design of the seismic work. Because the structure of the bridge itself is a relatively stable structure formed by the combination of pier, cover

beam and bridge plate. In order to better ensure the stability and safety of the bridge itself, it is also necessary to continuously strengthen the load bearing efficiency and load capacity of each structural part of the bridge, so as to accurately control the height of the bridge and the height difference of the pier from a deeper perspective, and lay a more perfect foundation and prerequisite. From a deeper perspective, it can also be well understood that the natural vibration period of the bridge itself is within 1 second, which provides a more perfect foundation support for the accurate control of the corresponding model structure in the future.

To fully embody the value and advantages of the seismic performance of the bridge, it is also necessary to have a more detailed grasp of the longitudinal pier height difference on a large level, and then manage and control the stability of the bridge itself from many different angles. In the long run, it is bound to improve the current situation of poor earthquake resistance of the bridge itself. In the process of using the mode decomposition method, employees in different positions should also have a deeper grasp of the application of this way and means. The correlation between the displacement of low-pier Bridges and the number of degrees of freedom is relatively small, so it can be calculated as a free body at a deeper level to ensure that the number of free heights of piers and columns can control its displacement at a deeper level, so as to ensure the overall and effective improvement of the corresponding seismic performance of the bridge itself. Through the control of the seismic carrying capacity of the bridge structure itself, the diversified development needs of the final seismic work can be well met, and the micro-processing load of the weak position can be strengthened more targeted, which can also ensure that the seismic design calculation can meet the corresponding work requirements [4].

4.4 Seismic design of displacement

For a long time in the past, Bridges have been the most important part of People's Daily travel. In order to ensure the full embodiment of the corresponding seismic work value and advantages, it is also necessary to further strengthen the grasp of the actual situation of the displacement of the longitudinal pier height difference bridge in the seismic design work, so as to ensure the full embodiment of the construction value and advantages of the relevant models. In the investigation and statistics of the actual situation of property and life loss caused by earthquakes in various countries in the past, it can also be well understood that the seismic design method of force can ensure the life, health and safety of the people. However, in the process of facing relatively serious earthquakes, the bridge itself will also have some serious damage, which requires a large amount of funds, making the value of the bridge itself and the use of functions difficult to be more fully and effectively reflected. If we want to reduce the occurrence of a large number of economic losses, we should continuously strengthen the accurate control of the fortification standards and performance objectives under the guidance of the seismic design performance and methods, and then reduce the damage caused by the earthquake from a deeper perspective, as well as the excessive expenditure of capital costs.

Good displacement management and control methods, in the current displacement control and management work, should also strengthen the reasonable adjustment of relevant targets and deformation, so that with the guidance and help of more accurate formula calculation, the adverse impact of earthquake disasters on bridge pier height difference can be improved. In the process of calculating the displacement of bridge pier height difference, it is also necessary to assume the rationality of the position height of bridge pier, so that regional movement can be carried out within the specified range, which is of great help to the improvement of the corresponding seismic efficiency in the future. For the construction of seismic bridge model, it is also necessary to follow more stringent standards. In the selection process of its raw material properties, it has relatively high requirements for its strength, compressive capacity, elasticity and stability. Moreover, it is precisely because the height of the bridge is mostly set according to the actual situation such as rivers and valleys, in order to better

ensure the integrity and safety of the structure of the bridge itself, it is also very necessary to strengthen the accurate design and control of the model structure.

5. Conclusion

In summary, the influence of longitudinal pier height difference on the seismic response of Bridges is mainly influenced by various external factors. Only by continuously strengthening the detailed grasp and understanding of each group of factors within the scope of bridge construction can we ensure that the safety and stability of the bridge itself can be improved more comprehensively and effectively from a deeper perspective. In the discussion process of the above article, the elevation transfer measurement of high piers, the seismic design of force, the seismic design of force, and the seismic design of displacement from a very detailed perspective ensure that the value and advantages of the longitudinal pier height difference to the seismic response work of the bridge are fully reflected, and the situation in line with the diversified development trend of modern society is created in a real sense.

References

S. Khatiwada,N. Chouw,J.W. Butterworth(2014).A generic structural pounding model using numerically exact displacement proportional damping. Engineering Structures.

Evgueni T. Filipov,Jessica R. Revell,Larry A. Fahnestock,James M. LaFave,Jerome F. Hajjar, Douglas A. Foutch,Joshua S. Steelman(2013).Seismic performance of highway bridges with fusing bearing components for quasi-isolation.Earthquake Engineering & Structural Dynamics.

Joshua S. Steelman,Larry A. Fahnestock,Evgueni T. Filipov,James M. LaFave,Jerome F. Hajjar, Douglas A. Foutch(2013).Shear and Friction Response of Nonseismic Laminated Elastomeric Bridge Bearings Subject to Seismic Demands. Journal of Bridge Engineering.

Evgueni T. Filipov,Larry A. Fahnestock,Joshua S. Steelman,Jerome F. Hajjar,James M. LaFave, Douglas A(2013).Evaluation of quasi-isolated seismic bridge behavior using nonlinear bearing models. Foutch.Engineering Structures.